

CLAIMS

What is claimed is:

1. A method for reducing or eliminating water block around a well bore of a well bore region in a reservoir, the method comprising:
  - removing the water from around the well bore;
  - injecting crude oil around the well bore; and
  - injecting precipitants causing surface precipitation of asphaltenes thereby altering formation wettability in the well bore and decreasing capillary forces of retention for water and/or gas condensates and increasing the flow of hydrocarbon fluids from the reservoir.
2. The method of claim 1 wherein the precipitants are aliphatic hydrocarbons.
3. The method of claim 2 wherein the aliphatic hydrocarbon comprises predominantly aliphatic refined mineral oil.
4. The method of claim 1 wherein reservoirs are selected from the group consisting of oil reservoirs, gas reservoirs, and gas storage reservoirs and the hydrocarbon fluids are selected from the group consisting of crude oil and natural gases.
5. The method of claim 1 and further comprising:
  - injecting brine co-solvent around the well bore.
6. The method of claim 5 and further comprising:
  - injecting the brine co-solvent to a range of between approximately two (2) feet and approximately ten (10) feet from the well bore.
7. The method of claim 5 wherein the brine co-solvent is an alcohol selected from the group consisting of methanol, ethanol, iso-propanol, and butanol.

8. The method of claim 5 wherein the co-solvent is tetrahydrofuran.
9. The method of claim 5 wherein the brine co-solvent is a micellar surfactant solution of an alcohol or other co-solvent.
10. The method of claim 1 wherein the crude oil used for injecting has wettability alteration properties including surface precipitation onto the mineral surfaces in the well bore region.
11. The method of claim 1 wherein the reservoir is a gas reservoir, and further comprising:
  - allowing gas or hydrocarbon condensates to interact with the crude oil causing surface precipitation of asphaltenes in the well bore region.
12. The method of claim 1 and further comprising:
  - repeating the removing of water by injecting crude oil two or more times
  - thereby maintaining altered wettability of the well bore region and
  - reducing water saturation in the well bore region.
13. The method of claim 1 wherein the well bore region is selected from the group consisting of perforated regions, open holes, and faces of hydraulic fractures.
14. The method of claim 1 wherein change in the wettability is to a weakly water wet form.
15. The method of claim 1 wherein the change in the wettability is to a neutral wet form.
16. The method of claim 1 wherein the change in the wettability to an oil wet form.
17. The method of claim 1 wherein the change in the wettability includes degrees of wetting between weakly water wet and oil wet.

18. The method of claim 1 and further comprising:  
adding a low concentration of an oil soluble surfactant for promoting the wettability and to enhance wettability alteration in the well bore region.
19. The method of claim 18 wherein the oil soluble surfactants are nitrogen derivatives selected from the group consisting of amines and polyamines.
20. The method of claim 1 wherein the crude oil or combination of crude oils used for injection into gas condensate reservoir or oil reservoir is selected by asphaltene content, surface adsorption, and precipitation characteristics.
21. The method of claim 1 wherein lower asphaltene-content oil is used for gas, condensate, or oil reservoirs with low permeability thereby minimizing plugging of the formation by asphaltene deposition.
22. The method of claim 1 and further comprising:  
adding precipitants prior to injection thereby adjusting the composition of a crude oil and changing the solvent properties with respect to adsorption or surface precipitation.
23. The method of claim 22 wherein the precipitants are selected from the group consisting of an alkane and aliphatic crude oil.
24. The method of claim 23 wherein the aliphatic hydrocarbon comprises a paraffinic crude oil being free from asphaltene.
25. The method of claim 18 and further comprising:  
adding surfactants in an oleic phase for reducing the interfacial tension between oil and water phases and decreasing the operational pressure drop required to displace water.
26. The method of claim 1 and further comprising:

treating gas storage reservoir to promote the efficiency of gas charge or discharge.

27. The method of claim 1 and further comprising:  
assessing the wettability alteration by forced and spontaneous imbibitions tests.

28. The method of claim 1 wherein decreasing the water wetness of mineral surfaces in the well bore region can be achieved by using water-based muds.